CLAIMS

1-8. (Cancelled)

9. (Currently Amended) A compensation system programmed to mitigate errors associated with a conversion system, the compensation system comprising:

a digital error model programmed to provide an emulated error signal as a function of an input signal that is quantized in a predetermined number of one or more levels, the digital error model having parameters adaptively adjusted based on a signal of the conversion system to emulate error characteristics associated with at least a portion of the conversion system; and

a calibration system that provides a calibration signal that is substantially free of in-band frequencies to the conversion system, the calibration system calibrates the parameters of the digital error model in a calibration mode by adapting the parameters of the digital error model during the calibration mode based on content of an output signal of the conversion system in response to the calibration signal that is provided to the conversion system, and wherein the calibration system includes an estimator having:

a first delay element that receives the quantized signal;

a bit splitter that receives an output from the delay first element;

a matrix multiplier that receives an output from the bit splitter;

a gain element that receives an output from the matrix multiplier;

an adder that receives an output from the gain element; and

a second delay element that receives an output from the adder and that provides its output to the adder.

10. (Original) The compensation system of claim 9, the calibration system further comprising an estimator operative to minimize error in the output signal by adjusting the parameters of the digital error model based on at least one of the input signal and the output signal of the conversion system.

11. (Previously Presented) The compensation system of claim 9, wherein the output signal of the conversion system corresponds to a residual error signal that minimizes as the digital error model better approximates error characteristics of the conversion system.

12. (Original) The compensation system of claim 11, further comprising a filter that filters the output signal of the conversion system to provide the residual error signal substantially free of out-of-band frequencies.

13-14. (Cancelled)

15. (Currently Amended) A conversion system comprising:

a modulator that provides a quantized signal that is quantized in a predetermined number of one or more levels;

a digital error model programmed to provide an emulated error signal to the modulator as a function of the quantized signal, the digital error model having parameters adaptively adjusted based on a signal of the conversion system to emulate error characteristics;

a digital-to-analog converter (DAC) coupled to receive the quantized signal and to convert the quantized signal to a corresponding analog output signal, the error characteristics being error characteristics associated with the DAC; and

a calibration system that generates a calibration signal in a calibration mode that substantially free of in-band frequencies and that calibrates the parameters of the digital error model during a calibration mode based on the analog output signal corresponding to the calibration signal, and the calibration system includes an estimator having:

a first delay element that receives the quantized signal;

a bit splitter that receives an output from the delay first element;

a matrix multiplier that receives an output from the bit splitter;

a gain element that receives an output from the matrix multiplier;

an adder that receives an output from the gain element; and

a second delay element that receives an output from the adder and that provides its output to the adder.

16. (Currently Amended). A compensation system programmed to mitigate errors associated with a conversion system, the compensation system comprising:

a digital error model programmed to provide an emulated error signal as a function of an input signal that is quantized in a predetermined number of one or more levels, the digital error model having parameters adaptively adjusted based on a signal of the conversion system to emulate error characteristics associated with at least a portion of the conversion system;

a digital-to-analog converter (DAC) coupled to receive the input signal that is quantized in the predetermined number of levels and to convert the input signal to a corresponding analog output signal, the error characteristics being error characteristics associated with the DAC;

an analog filter that substantially removes out-of-band frequencies and quantization noise from the corresponding analog output signal, and provides a filtered analog signal;

an analog-to-digital converter that receives and converts the filtered analog signal into a corresponding digital representation of the filtered signal; and

a calibration system that calibrates the parameters of the digital error model as a function of the digital representation of a filtered calibration signal so as to mitigate errors in the digital representation of the filtered calibration signal, wherein a calibration signal that corresponds to the filtered calibration signal is substantially free of in-band frequencies, and the calibration system includes an estimator having:

a first delay element;

a bit splitter that receives an output from the delay first element;

a matrix multiplier that receives an output from the bit splitter;

a gain element that receives an output from the matrix multiplier;

an adder that receives an output from the gain element; and

a second delay element that receives an output from the adder and that provides its output to the adder.

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17. (Cancelled)

18. (Currently Amended) A compensation system programmed to mitigate errors associated with a conversion system, in combination with an analog-to-digital converter (ADC) system that forms part of the conversion system, the compensation system combination comprising:

a digital error model programmed to provide an emulated error signal as a function of an input signal that is quantized in a predetermined number of one or more levels, the digital error model being parameterized by an error coefficient vector that includes a plurality of error coefficients, at least a portion of the plurality of error coefficients being adaptively adjusted based on a calibration signal from the conversion system that is substantially free of in-band frequencies to emulate error characteristics associated with at least a portion of the conversion system; and

the ADC system comprising:

a noise-shaping filter that receives an analog input signal and provides a filtered representation of the analog input signal;

an ADC that converts the filtered representation of the analog input signal to a corresponding digital output signal, the digital output signal defines the input signal having the predetermined number of levels; and

a digital-to-analog converter (DAC) that converts the digital output signal of the ADC to a corresponding analog representation thereof that is provided to the noise shaping filter; and

the at least a portion of the plurality of error coefficients of the model being calibrated using a calibration system to provide the emulated error signal as a function of the corresponding digital output signal of the ADC to mitigate errors in the digital output signal, the error characteristics being error characteristics

associated with the DAC, wherein calibration system that calibrates the parameters of the digital error model as a function of the filtered digital signal by adaptively adjusting the parameters of the model to mitigate errors in the filtered digital signal and wherein the calibration system includes an estimator having:

a first delay element;

a bit splitter that receives an output from the delay first element;

a matrix multiplier that receives an output from the bit splitter;

a gain element that receives an output from the matrix multiplier;

an adder that receives an output from the gain element; and

a second delay element that receives an output from the adder and that provides its output to the adder.

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19. (Currently Amended) The combination of claim 18, further comprising:

a digital filter that substantially removes out-of-band frequencies in the corresponding digital output signal of the ADC, and the digital filter provides a filtered digital signal~~; and~~

~~a calibration system that calibrates the parameters of the digital error model as a function of the filtered digital signal by adaptively adjusting the parameters of the model to mitigate errors in the filtered digital signal~~.

20. (Cancelled)

21. (Currently Amended) A conversion system comprising:

a noise shaping filter that provides a noise-shaped signal for conversion to a corresponding output signal of the conversion system;

a model operative to introduce a compensation error signal into the conversion system based on a digital representation of the noise-shaped signal having plural quantization levels; and

a calibration system that adaptively programs parameters of the model during a calibration mode in which a calibration signal that is substantially free of in-band frequencies is provided to the conversion system, the calibration system adapting the parameters of model in the calibration mode to emulate error characteristics associated with at least a portion of the conversion system by adjusting parameters of the model to mitigate residual error in the output signal of the conversion system, wherein the calibration system includes an estimator having:

a first delay element;

a bit splitter that receives an output from the delay first element;

a matrix multiplier that receives an output from the bit splitter;

a gain element that receives an output from the matrix multiplier;

an adder that receives an output from the gain element; and

a second delay element that receives an output from the adder and that provides its output to the adder..

22. (Currently Amended) The system of claim 21, wherein the ~~calibration system further comprising an~~ estimator is operative to minimize error in the output signal by adjusting the parameters of the model based on at least one of the digital representation of the noise-shaped signal and the output signal of the conversion system.

23. (Previously Presented) The system of claim 21, wherein the calibration signal being provided substantially free of in-band frequencies, such that the output signal of the conversion system corresponds to a residual error signal that minimizes as the model better approximates the error characteristics during the calibration mode.

24. (Original) The system of claim 23, further comprising a filter that filters the output signal of the conversion system to provide the residual error signal substantially free of out-of-band frequencies.

25. (Original) The conversion system of claim 21 defining an analog-to-digital converter (ADC) system, the ADC system further comprising:

an ADC that converts the noise-shaped signal to a corresponding digital output signal, the digital output signal defines the digital representation of the noise-shaped signal;

a digital-to-analog converter (DAC) that converts the digital output signal of the ADC to a corresponding analog representation thereof that is provided to the noise shaping filter; and

the model being calibrated to provide the emulated error signal as a function of the digital output signal of the ADC to mitigate errors in the digital output signal, the error characteristics being error characteristics associated with the DAC.

26. (Original) The conversion system of claim 21 defining a digital-to-analog converter (DAC) system, the DAC system further comprising:

a quantizer that provides a quantized signal based on the noise-shaped signal, the quantized signal defining the digital representation of the noise-shaped signal;

a DAC that converts the quantized signal to a corresponding analog signal that defines the output signal of the conversion system, the error characteristics being error characteristics associated with the DAC; and

the error model providing the emulated error signal to the noise shaping filter as a function of the quantized signal.

27-31. (Cancelled)